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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/863,885

05/22/2001

Eric Hauptfear

MTC 6721.1;  
39-21(51835)

9345

321 7590 08/27/2002

SENNIGER POWERS LEAVITT AND ROEDEL  
ONE METROPOLITAN SQUARE  
16TH FLOOR  
ST LOUIS, MO 63102

EXAMINER

ZUCKER, PAUL A

ART UNIT

PAPER NUMBER

1621

DATE MAILED: 08/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/863,885

Applicant(s)

HAUPFEAR ET AL.

Examiner

Paul A. Zucker

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-347 is/are pending in the application.
- 4a) Of the above claim(s) 216 and 217 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 96-100, 337, 338 and 340-347 is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) 4-43, 47-51, 55, 63, 67, 68, 77-95, 106, 114, 120-134, 137-146, 149-152, 176-187, 191-216, 225, 236 and 327-336 is/are objected to.
- 8) ☒ Claim(s) 1-347 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

U.S. Patent and Trademark Office  
PTO-326 (Rev. 04-01)

**Office Action Summary**

Part of Paper No. 8

Continuation of Disposition of Claims: Claims rejected are 1-3, 27, 44-46, 52-54, 56-62, 64-66, 69, 70-76, 101-105, 107-113, 115-119, 135, 136, 147, 148, 153-175, 188-190, 217-224, 226-235, 237-326 and 339.

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election without traverse of Group I (claims 1-215 and 21-347) in Paper No. 7 is acknowledged.

### ***Specification***

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

### ***Claim Objections***

3. Claims 325 and 326 are objected as substantial duplicates of each other.
4. Claim 337 is objected to because of the following informalities: The word "for" in line 1 should be changed to "forth". Appropriate correction is required.
5. Claims 4-43, 47-51, 55, 63, 67, 68, 77-95, 106, 114, 120-134, 137-146, 149-152, ~~176-187, 191-216, 225, 236, 327-336~~ are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 27 recites the limitation "mother liquor produced incrementally thereby". This limitation renders the claim incomprehensible since the mother liquor is incrementally removed by evaporation and is not produced.
7. Claims 164-169 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 164-169 recite the limitation "O<sub>2</sub> is utilized" in line 3. It is unclear whether "utilized" means "is consumed" or "is available for use" (i.e. dissolved). This limitation therefore renders the claims indefinite.
8. Claim 227 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 227 recites the limitation "said aqueous crystallization feed mixture" in line 6. There is insufficient antecedent basis for this limitation in the claim.
9. ~~Claims 242-277 is rejected under 35 U.S.C. 112, second paragraph, as being~~  
indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 242 recites the limitation "maintaining the difference in unit weight sensible heat content" in 16. The difference in unit weight sensible heat content has not been defined. Claim 242 and its dependents are therefore rendered indefinite.

10. Claim 339 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 339 appears to be a sentence fragment and is incomprehensible as written. Claim 339 is therefore rendered indefinite.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1 and 2 are rejected under 35 U.S.C. 102(b) as being anticipated by Morgenstern et al (US 6,232,494 05-2001). Morgenstern discloses (Column 25, line 57- column 26, line 11) a process for making N-(phosphonomethyl)glycine via the oxidation of N-(phosphonomethyl)iminodiacetic acid in multiple reaction zones (FIG. 2) to produce a reaction solution comprising N-(phosphonomethyl)glycine which is evaporated to precipitate a portion of the N-(phosphonomethyl)glycine product which is recovered. Morgenstern further discloses (Column 25, lines 31-41) cooling of the reaction mixture to precipitate the N-(phosphonomethyl)glycine product. The instantly claimed process where precipitation is carried out on two separate portions of the initial reaction solution is indistinguishable from that disclosed by Morgenstern. Morgenstern further discloses (Column 26, lines 1-11) that a portion of the mother

liquor is subjected to a second oxidation process (Cf. instant claim 52) in the continuous process.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 3, 44-46, 52-54, 56-62, 64-66, 69,70-76, 101-105, 107-113, 115-119,135,136, 147,148, 153-175, 188-190, 217-224, 226-235, 237-241, 278-289,

290-326 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Morgenstern et al (US 6,232,494 05-2001) as applied to claims 1 and 2 above, and further in view of Fujiwara et al (US 5,202,479 04-1993) and Ebner et al (US 6,417,133 07-2002).

Instantly claimed is a process for the preparation of N-(phosphonomethyl)glycine via the oxidation of N-(phosphonomethyl)iminodiacetic acid. Particularly claimed is the

method of purification of the product by two sequential crystallizations with partial recycle of the recovered mother liquor back to an oxidation zone. The use of fixed- and fluidized-bed reactors as well stirred tank reactors are claimed as well as the use of a catalyst with 95% of the particles between 3-100  $\mu\text{m}$ .

Morgenstern teaches (Column 3, lines 61-67 and column 11, lines 16-20) the use of iminodiacetic acid as a starting material in the process of making N-(phosphonomethyl) glycine although Morgenstern prefers use of monocarboxylic acid substrates. Morgenstern teaches (column 18, lines 10-46) the oxidation of N-substituted-N-(phosphonomethyl) glycine reactants in a liquid phase in the presence of gaseous oxygen and a heterogeneous catalyst. Flows of gas and liquid are necessarily cocurrent since the gas is dissolved in the liquid. Morgenstern teaches (column 33, lines 43-50) initial reactant feed concentrations of 1-80%. Morgenstern further teaches (Column 18, lines 62-65) the use of heterogeneous noble metal catalysts on carbon support. Morgenstern further teaches (Column 41, lines 3-4) ~~post-reaction filtration of the catalyst.~~ Morgenstern teaches (Column 25, lines 33-35) intermediate cooling of the partially complete reaction solution. Morgenstern is silent with regard to chloride ion content in the N-substituted-N-(phosphonomethyl) glycine source so it is assumed to be negligible (Cf. instant claims 11-17). Morgenstern further teaches (Page 2, right column, lines 36-37) the use of fixed bed reactors (packings implied) in oxidation reactions. Morganstern teaches (Column 26, lines 8-11) both recycle and purging of the mother liquor and suggests that the ratio can be



varied. Morganstern teaches, at the indicated locations, use of an impellor for back-mixing (Column 23, lines 20-24) and stirred tank reactors (Column 23, lines 43-47) with oxygen sparging. Morganstern teaches (Column 24, lines 17-18) conducting the oxidation reaction at 50 to 200 °C. Morgenstern further teaches (Column 46, lines 5-9) cooling the reaction solution with a reflux condenser (external heat transfer recirculation loop).

Morganstern further teaches (Column 23, line 64- column 24, line 5) utilization of at least 90% of the oxygen introduced into the oxidation reaction solution. Morgenstern is silent with regard to the numbers of moles of oxygen introduced, it is presumed however, that the partial pressures (5-500 psig) of oxygen taught (Column 24, lines 31-33) deliver the instantly claimed molar ratios. These pressures determine the maximum pressures at any point in the system as well.

Morganstern teaches (Column 36, line 63 – column 37, line 34) catalyst leaching and its decreasing rate with increasing catalyst concentration in solution.

Morgenstern teaches (Column 20, lines 28 –68) the addition of a promoter metal to the catalyst in amounts of 0.05% by wt.

By-products formaldehyde and formic acid are oxidized in each of the oxidation steps. The rates of introduction of starting material and withdrawal of product are readily optimized by one of ordinary skill in the art. Morgenstern is silent with regard to the numbers of moles of oxygen introduced, it is presumed however, that the partial pressures of oxygen taught (Column 24, lines 31-33) deliver the instantly

claimed molar ratios. The claimed percentages of oxygen consumed correspond to the percentages of substrate consumed (Column 25, lines 43-51) as taught by Morganstern. While Morganstern is further silent with regard to the concentrations of unreacted starting material in the various effluents, working volume ratios and reactor residence times such would be routinely adjusted by one of ordinary skill in the art in optimizing the process and do not confer patentability.

One difference between the instantly claimed process and that taught by Morganstern is that the instant process makes use of evaporative crystallization of the product N-(phosphonomethyl) glycine.

Fujiwara, however, teaches (Column 2, line 63 – column 3, line 20) a process for the preparation of glycine (of which the instant N-(phosphonomethyl) glycine is an analogue) which comprises two concentration steps, crystallization and recycling of a portion of the mother liquor to the reaction. Fujiwara further teaches (Column 8, lines 8 - 32) crystallization of the product by evaporative concentration of the solution with cooling provided by conducting the evaporation at reduced pressure under vacuum at temperatures of from 0° to 80 °C. Fujiwara further teaches (Column 5, lines 50-61) that carrying out the concentration steps at low temperature reduces the formation of byproducts such as 2,5-diketopiperazine (potentially a problem in the instant case as well).

The differences between the instantly claimed process and that taught by the combination of Morganstern and Fujiwara is that the instant process makes use of fixed- and fluidized-bed reactors as well stirred tank reactors as well as catalyst with a specified particle size range.

Ebner, however, teaches (Column 3, lines 5 –20) a process for the preparation of N-(phosphonomethyl) glycine via the catalytic oxidation of N-(phosphonomethyl)iminodiacetic acid. Ebner further teaches (Column 8, lines 8 - 32) an improved catalyst having 95% of the particles between 3-100  $\mu\text{m}$ . The additionally claimed ranges are encompassed by the range taught by Ebner. Ebner further teaches (Column 21, lines 41-47) the equivalence of stirred tank, fixed- and fluidized-bed reactors in the oxidation process.

Thus the instantly claimed process would have been obvious to one of ordinary skill in the art. The motivation would have been to modify the process of Morganstern using the teaching of Furakawa to avoid the formation of product impurities such as 2,5-diketopiperazine during the purification of the product N-(phosphonomethyl) glycine. Ebner teaches further improvements in the process are. The expectation for success would have been high based upon the expected close chemical behavior of the analogous compounds glycine and N-(phosphonomethyl) glycine and the precisely coincident fields of invention of the instant invention and Ebner.

***Allowable Subject Matter***

13. Claims 96-100, 337, 338 and 340-347 are allowed. The following is a statement of reasons for the indication of allowable subject matter: The closest art of record : Morgenstern et al (US 6,232,494 05-2001), Fujiwara et al (US 5,202,479 04-1993) and Ebner et al (US 6,417,133 07-2002) either alone or in combination neither discloses nor fairly suggests the use of a catalyst recycle stream, the use of additional feed streams to each oxidation reaction zone.

***Conclusion***

14. Claims 1-347 are outstanding. Claims 1-3, 27, 44-46, 52-54, 56-62, 64-66, 69, 70-76, 101-105, 107-113, 115-119, 135, 136, 147, 148, 153-175, 188-190, 217-224, 226-235, 237-326 and 339 are rejected. Claims 4-43, 47-51, 55, 63, 67, 68, 77-95, 106, 114, 120-134, 137-146, 149-152, 176-187, 191-216, 225, 236 and 327-336 are objected to. Claims 96-100, 337, 338 and 340-347 are allowed. Claims 216 and 217 are held withdrawn from consideration.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Zucker whose telephone number is 703-306-0512. The examiner can normally be reached on Monday-Friday 7:00-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 703-308-4532. The fax phone numbers for the organization where this application or proceeding is assigned are

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703-308-4556 for regular communications and 703-308-4556 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1235.

Paul A. Zucker  
Patent Examiner  
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August 25, 2002

  
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